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| EXAMINER | |
|---|---|
| ZARKA, DAVID PETER | |

| ART UNIT | PAPER NUMBER |
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| 2624 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/596,321 | CARLSEN ET AL. | |
| | Examiner | Art Unit | |
| | DAVID P. ZARKA | 2624 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *16 March 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### Table of Contents



### Amendments & Claim Status

**[1]** This Detailed Action is responsive to Amendment received Mar. 16, 2011. Claims 1-10 remain pending.

### Claim Rejections - 35 U.S.C. § 112

**[2]** The following is a quotation of the first paragraph of 35 U.S.C. § 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

New Matter

**[3]** Amendment at 6, 7 regarding rejected Claims 1-10 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement have been respectfully and fully considered, but are found unpersuasive.

Applicant points to page 7, lines 24-27 of the originally filed application and argues that a plurality of significant landmarks $\{L_i\}$ are selected in both images A and B. One of ordinary skill in the art would understand that if at least one further landmark is registered in one image, a

corresponding at least one further landmark may be registered in the other image so that the similarity S between the new simplex can be determined. See Amendment at 6 and 7.

However, firstly, page 7, lines 24-27 of the originally filed application, as cited by Applicant, corresponds to (i) steps S1 and S2 of fig. 2; and (ii) the selecting method-steps of Claim 1 only. The registering claim method-step under question applies to steps S6 and S7.

Secondly, the registering claim method-step under question is a conditional statement consistent with steps S6 and S7. Two examples are provided in response to "yes" to step S6 to add "new landmark" in S7. See figs. 4-6 (the first example selects landmark $L_6$ in the second fig. 5 image (the first image being fig. 4), the second example selects landmark $L_7$ in the second fig. 6 image (the first image being fig. 5)). One of ordinary skill in the art would understand, in view of the specification, that if the similar value is less than a pre-selected value at step S6, then only new landmarks are being registered from the second image consistent with (i) steps S6 and S7; and (ii) the two figs. 4-6 examples.

**[4]** **Claims 1-10** are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 1, lines 11-13 cite "the registering including selecting at least one further first landmark in the first image and at least one further second landmark in the second image as a function of a pre-selected value of the similarity value". However, the specification supports registering includes only selecting at least one further second landmark in the second image as a function of a pre-selected value of the similarity value. See Specification at p. 9, ll. 13-26 and between figs. 4, 5 (showing that only one further second landmark $L_6$ is selected in the second image, when the first image is fig. 4 and the second image is fig. 5). See also Specification at p. 9, l. 27 – p. 10, l. 10 and between figs. 5, 6 (showing that only one further second landmark $L_7$ is selected in the second image, when the first image is fig. 5 and the second image is fig. 6).

It is suggested to change to "the registering including selecting ~~at least one further first landmark in the first image and~~ at least one further second landmark in the second image as a function of a pre-selected value of the similarity value".

**Claims 2** and **8-10** by analogy.

## Claim Rejections - 35 U.S.C. § 102

**[5]** The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Pardas

**[6]** Amendment at 7-9 regarding rejected Claims 1 and 8-10 are rejected under 35 U.S.C. § 102(b) as being anticipated by Pardas et al., U.S. Pub. No. 2003/0048955 ("Pardas") have been respectfully and fully considered, but are found unpersuasive.

Applicant argues that because the uppermost level is the result of a further merging step, which merges the remaining two elements on the left in the preceding level, the different levels in fig. 4 are not different images. They are instead "the same image, but after merging or segmentation". Amendment at 8.

Examiner agrees a same underlying image exists in fig. 20. However, the set of mesh proposals in fig. 20 divides the underlying image into a plurality of images (or "sub-images"). Each mesh proposal in fig. 20, comprising its own distinct set of pixels and size, is its own image. The rejection is drawn to the plurality of images, not the underlying image as argued by Applicant.

Applicant argues Pardas' two criteria are not values. Even if they are, Pardas is silent regarding a similarity value between these two regions. Amendment at 8.

However, whether "a high gradient component of the signal crosses one edge of this triangle" is a value (i.e., "yes" or "no"). Whether a triangle is "of very large size" is also the same values. The similarity value only "relates" to a similarity of a first region in the first image and a second region in the second image. For example, a similarity value, that segments a triangle of very large size in a first image into two triangles in the second image, "relates" to a similarity of a first region in the first image and a second region in the second image.

**[7]** **Claims 1** and **8-10** are rejected under § 102(b) as being anticipated by Pardas.

Regarding **Claim 1**, Pardas discloses a method (fig. 1) of registering a first image (the second-from-top image at fig. 20) and a second image (the third-from-top image at fig. 20), the method comprising the steps of:

selecting, by an image processing device (it is implicit the complex computations are performed by a computer), at least one first landmark (fig. 20, item L1 in copied figure below) in the first image;

selecting, by an image processing device (it is implicit the complex computations are performed by a computer), at least one second landmark (fig. 20, item L2 in copied figure below) in the second image, wherein the at least one first landmark corresponds to the at least one second landmark (items L1 and L2 correspond to each other); and

registering, by an image processing device (it is implicit the complex computations are performed by a computer), the first and second images by using a similarity value (e.g., "if a high gradient component of the signal crosses one edge of this triangle" for the "first criterion" at ¶ 0057; "a triangle of very large size. . .should be segmented. . ." for the "second criterion" at ¶ 0057) which relates to a similarity of a first region (fig. 20, item P1 in copied figure below) determined by the at least one first landmark and a second region (fig. 20, item P2 in copied figure below) in the second image determined by the at least one second landmark,

the registering including selecting at least one further first landmark (fig. 20, item L3 in copied figure below that was segmented from the top image at fig. 20) in the first image and at

least one further second landmark (fig. 20, item L4 in copied figure below that was segmented from the second-from-top image at fig. 20) in the second image if the similarity value is "less than" a pre-selected value (e.g., when (i) a triangle is of a small size or (ii) a high gradient component does not cross any edge of the triangle at ¶ 0057).

Regarding **Claim 8**, Claim 1 cites identical features as in Claim 8, including

a memory (it is implicit the complex computations are performed by a computer containing memory) for storing the first image and the second image; and an image processor (it is implicit the complex computations are performed by a computer containing a processor) for registering the first image and the second image; wherein the image processor is adapted to perform the method-steps of Claim 1. Thus, references/arguments equivalent to those presented above for Claim 1 are equally applicable to Claim 8.

Regarding **Claim 9**, Claim 1 cites identical features as in Claim 9, including

a computer program (it is implicit the complex computations are performed by a computer containing software) on a computer-readable device (it is implicit the complex computations are performed by a computer) for registering a first and a second image, wherein the computer program causes a processor (it is implicit the complex computations are performed by a computer containing a processor) to perform the method-steps of claim 1when the computer program is executed on the processor. Thus, references/arguments equivalent to those presented above for Claim 1 are equally applicable to Claim 9.

Regarding **Claim 10**, Pardas discloses wherein the selecting the at least one further first landmark in the first image and the at least one further second landmark in the second image is based on the similarity value not exceeding the pre-selected value (the similarity value cannot meet for than the "two different criteria" used at ¶ 0057)

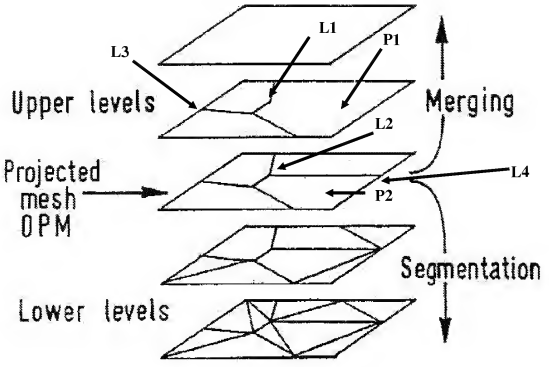


FIG.20

Erdem

**[8]** Amendment at 9 and 10 regarding rejected Claims 1 and 8-10 are rejected under 35 U.S.C. § 102(b) as being anticipated by Erdem et al., U.S. Pat. No. 5,982,909 ("Erdem") have been respectfully and fully considered, but are found unpersuasive.

Applicant argues that although new nodes are introduced in fig. 20c, fig. 20d does not show any new nodes not present in fig. 20c, but rather the same nodes in different positions. Amendment at 9 and 10.

However, the rejection does not apply figs. 20c, d. The rejection is instead drawn to figs. 20b, c that does show new nodes.

Applicant argues one of ordinary skill in the art would understand that a pre-selected value is a specific value (e.g., 1, 2, 3, etc.). Erdem does not disclose adding higher resolution nodes if the MAD or MSE "is less than a preselected value". Amendment at 10.

However, the "MAD or MSE value" in "the position of G 51 that minimizes the MAD or MSE value is registered" (Erdem at 11:5-23) is a value. MAD or MSE values that are not minimal values are the "preselected values". The MAD or MSE values that are minimal values are less than the preselected values, and are thus selected.

**[9]** **Claims 1** and **8-10** are rejected under 35 U.S.C. § 102(b) as being anticipated by Erdem et al., U.S. Pat. No. 5,982,909 ("Erdem").

Regarding **Claim 1**, Erdem discloses a method (fig. 20; 17:40-67) of registering a first image (fig. 20b image) and a second image (fig. 20c image), the method comprising the steps of:

selecting, by an image processing device (fig. 1, item 2), at least one first landmark (e.g., the middle point in fig. 20b, node item 121) in the first image;

selecting, by an image processing device (fig. 1, item 2), at least one second landmark (the corresponding middle point in fig. 20c to the middle point in fig. 20b) in the second image, wherein the at least one first landmark corresponds to the at least one second landmark (the middle points of both figs. 20b, c correspond to each other); and

registering, by an image processing device (fig. 1, item 2), the first and second images by using a similarity value (fig. 2, hexagonal search item 50; "the position of G 51 that minimizes the MAD or MSE value is registered" at 11:5-23, emphasis added) which relates to a similarity of a first region (a corresponding triangle block in fig. 20b to the middle point) determined by the at least one first landmark and a second region (a corresponding triangle block in fig. 20c to the middle point) in the second image determined by the at least one second landmark,

the registering including selecting at least one further first landmark ("new inside and boundary nodes" at 17:40-67; any node of fig. 20b not included in a previous lower resolution image, support by "Once step 50 is completed with high-resolution nodes in the mesh 121, still higher resolution nodes can be added to the mesh 121 and step 50 then repeated any number of times" at 17:43-56) in the first image and at least one further second landmark ("new inside and boundary nodes" at 17:40-67; any node of fig. 20c not included in fig. 20b) in the second image

if the similarity value (fig. 2, hexagonal search item 50; "the position of G 51 that minimizes the MAD or MSE value is registered" at 11:5-23, emphasis added) is less than a pre-selected value (e.g., MAD or MSE values that are not minimal values).

Regarding **Claim 8**, Claim 1 cites identical features as in Claim 8, including

a memory (fig. 1, item 2) for storing the first image and the second image; and an image processor (fig. 1, item 2) for registering the first image and the second image; wherein the image processor is adapted to perform the method-steps of Claim 1. Thus, references/arguments equivalent to those presented above for Claim 1 are equally applicable to Claim 8.

Regarding **Claim 9**, Claim 1 cites identical features as in Claim 9, including

a computer program ("software programs" at 3:10-37) on a computer-readable device (fig. 1, item 2) for registering a first and a second image, wherein the computer program causes a processor (fig. 1, item 2) to perform the method-steps of claim 1when the computer program is executed on the processor. Thus, references/arguments equivalent to those presented above for Claim 1 are equally applicable to Claim 9.

Regarding **Claim 10**, Erdem discloses wherein the selecting the at least one further first landmark in the first image and the at least one further second landmark in the second image is based on the similarity value not exceeding ("the position of G 51 that minimizes the MAD or MSE value" at 11:5-23cannot exceed the MAD or MSE value) the pre-selected value.

## Claim Rejections - 35 U.S.C. § 103

**[10]** The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Pardas in view of Moshfeghi

**[11]** **Claim 7** is rejected under § 103(a) as being unpatentable over Pardas in view of Moshfeghi, U.S. Pat. No. 5,633,951 ("Moshfeghi").

Regarding **Claim 7**, Pardas does not disclose wherein the method is applied in medical imaging to one of CT data sets, MRI data sets, PET data sets, SPECT data sets, and ultrasonic imaging data sets.

Moshfeghi teaches registration of elastic volumetric images by matching surfaces (2:46-56; e.g., fig. 4) that includes applying in medical imaging to one of CT data sets, MRI data sets, PET data sets, SPECT data sets, and ultrasonic imaging data sets (4:9-37). Pardas and Moshfeghi are combinable because they are from the same field of endeavor and similar problem solving area.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the method of Pardas to be applied in medical imaging to one of CT data sets, MRI data sets, PET data sets, SPECT data sets, and ultrasonic imaging data sets as taught by Moshfeghi "to entirely automate the entire contour extraction process using built in knowledge of the anatomy of the body region scanned, the present best mode of implementing the contour extraction process involves user interaction." Moshfeghi at 5:36-51. Therefore, it would have been obvious to combine Moshfeghi with Pardas to obtain the invention as specified in Claim 7.

Erdem in view of Moshfeghi

**[12]** Amendment at 10 and 11 regarding rejected Claim 7 under § 103(a) as being unpatentable over Erdem in view of Moshfeghi been respectfully and fully considered, but are found unpersuasive.

Applicant argues Moshfegi fails to cure the above-mentioned deficiencies of Erdem. Amendment at 10.

However, as argued above by Examiner, there are not deficiencies of Erdem for Moshfegi to cure.

**[13]** **Claim 7** is rejected under § 103(a) as being unpatentable over Erdem in view of Moshfeghi.

Regarding **Claim 7**, Erdem does not disclose wherein the method is applied in medical imaging to one of CT data sets, MRI data sets, PET data sets, SPECT data sets, and ultrasonic imaging data sets.

Moshfeghi teaches registration of elastic volumetric images by matching surfaces (2:46-56; e.g., fig. 4) that includes applying in medical imaging to one of CT data sets, MRI data sets, PET data sets, SPECT data sets, and ultrasonic imaging data sets (4:9-37). Erdem and Moshfeghi are combinable because they are from the same field of endeavor and similar problem solving area.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the method of Erdem to be applied in medical imaging to one of CT data sets, MRI data sets, PET data sets, SPECT data sets, and ultrasonic imaging data sets as taught by Moshfeghi "to entirely automate the entire contour extraction process using built in knowledge of the anatomy of the body region scanned, the present best mode of implementing the contour extraction process involves user interaction." Moshfeghi at 5:36-51. Therefore, it would have been obvious to combine Moshfeghi with Erdem to obtain the invention as specified in Claim 7.

## Allowable Subject Matter

**[14]** **Claims 2-6** would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. § 112, first paragraph.

Reasons for Indicating Allowable Subject Matter

**[15]** The following is a statement of reasons for the indication of allowable subject matter:

Regarding **Claim 2**, the prior art of record does not teach wherein the second number is the first number plus one; wherein the first and second landmarks are selected in accordance with a qualifying function, and wherein the third number is equal to the second number.

## Conclusion

**[16]** Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

**[17]** Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID P. ZARKA whose telephone number is (571)270-1578 and fax number (571)270-2578. The examiner can normally be reached Monday - Friday 7:30 - 17:00 ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*/David P. Zarka/*
Primary Examiner, Art Unit 2624